Appendix B

Memorandum:
Steve Botti, et al. to Superintendent, Grand Canyon National Park
1997

Memorandum

To: Superintendent, Grand Canyon National Park

From: Steve Botti, Fire Program Planning Manager, Fire Management Program Center, NIFC
Jim Douglas, Senior Fire Policy Advisor, DOI Office of Managing Risk and Public Safety
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Steve Tryon, BLM Budget Analyst, DOI Office of Budget

Subject: Hazard Fuels Reduction Program Analysis and Site Visit, North Rim of the Grand Canyon

On August 12, 13, and 14, 1997 we reviewed Grand Canyon National Park's prescribed burning program on the North Rim, along with the fire history and forest ecosystem restoration research currently being conducted by Northern Arizona University at Mt. Trumbull and on the North Rim. We wish to express our appreciation to the park staff for participating in this review and assisting with arrangements. Special thanks are due Dan Oltrogge, Bob Winfree, Ken Kerr, Steve Bone, and Johnny Ray for their insights into fire and ecosystem management issues as well as the their willingness to discuss the socio-political context within which these issues must be viewed by park management.

As you know, both Secretary Babbitt and Congress have expressed strong interest in reducing the number of large wildfires along with their accelerating costs and resource damage. In support of this goal, they have advocated expanded hazard fuels treatments and restoring forest health through fire use and mechanical treatments. Since the prescribed burning and mechanical fuels treatment programs on the North Rim and at Mt. Trumbull may establish significant interagency precedents for how to accomplish these goals, we felt that it would be beneficial to have a group of Interior fire policy and budget officials review the current situation. We all felt that this trip was informative and beneficial in the continuing debate over the proper mix of methods to achieve fuels and ecosystem management goals.

We commend the staff of Grand Canyon National Park for their willingness to explore innovative and challenging solutions to the difficult fire management problems on the North Rim. The NPS Fire Management Program Center and the Department will strongly support your efforts.

The attached trip report provides a synopsis of our impressions on these issues following our brief site visit.

TRIP REPORT: NORTH RIM OF THE GRAND CANYON FIRE MANAGEMENT PROGRAM REVIEW

August 12-14, 1997

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The North Rim has been selected as a study site for research on mechanical restoration of pre-settlement forests conducted by Dr. Wallace Covington at Northern Arizona University. That research, combined with the on-going prescribed natural fire and prescribed burning programs by the National Park offers an excellent opportunity to compare and contrast the relative effectiveness and practicality of prescribed fire and mechanical fuels removal for restoring natural forest structure and reducing fuels that have accumulated far beyond the natural range of variability. The debate on this issue between university scientists, park scientists, foresters, and fire managers has continued for the past 17 years. Recently, the debate has become national in scope as hazardous fuels accumulations have generated ever increasing numbers of large, intense, and damaging wildfires. Therefore, the results of the North Rim experiments and analysis may have applicability throughout many forests in the West.

While it is too early to predict the final outcome of this debate, we do wish to share some observations on current and proposed fire management activities on the North Rim, within the broader context of similar fuels and ecosystem problems throughout ponderosa pine and mixed conifer forests in the West.

The park and adjacent national forest have recognized for some time that the north rim forests have an unnaturally dense growth of under story trees due to the suppression of lightning fires and the cessation of aboriginal ignitions in the late nineteenth century. The continued encroachment of these “ladder” fuels under what was naturally an open canopy of pines and firs, together with the heavy accumulation of dead and downed fuels, has created the potential for widespread crown fires that will further disrupt the natural ecosystem and endanger public safety, cultural resources, park facilities, and market resources on the Kaibab National Forest.

The park has attempted to reduce this threat by prescribed burning several blocks on the North Rim. Unfortunately, prescribed burning on the North Rim has met with limited success. The suppression of both the Matthes Prescribed Burn and the Northwest III Prescribed Burn, along with concern over smoke impacts, has led to a conservative approach to reintroducing fire as a management tool for restoring the forest ecosystem and reducing hazardous fuels. It was clear from this meeting, however, that the park staff now supports a more aggressive prescribed burning and fuels treatment program using the full range of tools available.

At this and other meetings, and in published literature, some experts have expressed the opinion that prescribed burning in ponderosa pine/mixed conifer forests with heavy fuel accumulations and fuel ladders is too risky, both to burn team personnel and to natural and cultural resources

unless the forest is first mechanically thinned and the resulting biomass removed. This belief is reflected in the philosophy and methodology of Dr. Wallace Covington and his team from the College of Ecosystem Science and Management at Northern Arizona University. Testing the truth of this hypothesis should be a central component of the Park's fire management program over the next five to ten years. In order to help resolve this question, we recommend that the park begin to analyze the ten years of fire effects monitoring data that it has collected on past prescribed burns. These data will reveal whether long-term vegetative response and fuel loading trends are meeting management objectives. Both the fire management staff and the natural resources staff expressed an interest in completing this work, but so far little has been accomplished. The Inter-mountain regional fire staff has offered to assist with this effort if needed, and the national fire office also would be happy to arrange for data analysis support. It is critical that this analysis be completed in conjunction with similar work on the NAU plots in order to compare the results of the different methods. If the park implements a more aggressive prescribed burning program, as planned, it will be essential that fire effects data be collected and evaluated to determine the baseline conditions of fuels, forest structure, and key ecosystem components, and long-term changes produced by the burning.

While the level of hazardous fuels on the North Rim is a difficult management problem, it is not without precedent in the Service. Fuels accumulations in other ponderosa pine/mixed conifer ecosystems, such as in Yosemite, Sequoia & Kings Canyon, Lassen and Crater Lake national parks are equally as great, and in some cases present greater management difficulties. It has yet to be proven that either prescribed burning alone or in combination with mechanical treatments can correct the fuels problem quickly enough to prevent large, catastrophic wildfires. However the risks of no action far outweigh the risks of prescribed fire or mechanical thinning. There is no doubt that without intervention to modify the fuels complex, a unnatural and catastrophic wildfire will sweep across tens of thousands of acres on the North Rim within the next few years.

Dr. Covington's Forest Ecosystem Restoration Project offers one possible solution to this dilemma. By removing up to 90 percent of the forest and shrub biomass, and restoring a "pre-settlement" forest canopy, the NAU experiment has substantially reduced the wildfire risk on Mt. Trumbull and elsewhere in Northern Arizona. Whether this model truly mimics presettlement ecosystem conditions is still to be proven, as is whether these vignettes of the pristine ecosystem can be expanded to landscape scale in Grand Canyon National Park.

The principal advantages of the NAU approach are as follows:

- Risk to personnel safety, developments and resources from prescribed fire escape is reduced.
- The model for dating trees produces a specific target forest overstory structure as a management goal.
- Hazardous fuels are removed and the resulting forest structure permits the immediate restoration of a natural fire regime, or prescribed fire to mimic the natural regime.
- The forest restoration system generates income through the sale of timber, which can be used to partially pay for the treatment.
- The sale of timber and firewood can be beneficial to the local economy.

- Political, social, and regulatory problems associated with large smoke emissions from prescribed burns is reduced. The problem is not eliminated because the NAU methodology calls for follow-up prescribed burning to clean up debris left by the thinning operation and to restore the natural fire process into the fire dependent ecosystem.

The principal disadvantages of the NAU approach are as follows:

- Removing up to 90 percent of the trees throughout the North Rim would create intense public controversy by producing a significant impact on traditional visitor expectations for visual quality and natural quiet in a national park.
- Logging operations may conflict with the proposed wilderness designation of much of the North Rim.
- There may not be enough time to complete extensive mechanical fuels removal before a catastrophic wildfire occurs. Such an event would destroy any possibility of mechanical ecosystem restoration for many decades. The experience on Mt. Trumbull indicates that logging and slash burning a few acres per year is no easy task. The logistical difficulties of treating thousands of acres per year would be even more daunting. Prescribed burning thousands of acres of slash would present significant control difficulties. If left unburned, such slash might increase the potential for catastrophic wildfire, as has proven the case on many logging sales throughout the west. Burning slash from the ecosystem treatments on one block on Mt. Trumbull severely scorched and killed many of the leave trees and almost escaped control. The number of trees to be removed throughout most North Rim areas would be at least twice as many as on the Mt. Trumbull plot; thus safely treating the slash would prove even more difficult.
- The restoration work produces hundreds of stumps per acre, which become prominently visible after burning the slash. These stumps will remain visible for many decades.
- Restoring the presettlement shrub/herbaceous components following this treatment methodology appears more difficult and less successful that the immediate restoration of presettlement ponderosa pine. There is less quantitative data about the nature of these components in presettlement times, and the extensive ground disturbance with logging machinery, skid trails, and slash burning create an ideal environment for non-native weed species to invade.
- Despite income from logging sales, extensive tree thinning may prove prohibitively expensive compared to prescribed burning.

The difficulties associated with large-scale prescribed burning on the North Rim are well known. Smoke impacts together with the potential for fires to escape prescription will always remain a problem. However, it appears that a greatly expanded program to utilize fire as a management tool offers the best hope for preventing catastrophic wildfire and restoring the natural ecosystem in the long run. Many of the mistakes of the past can be avoided by utilizing the new funding for hazardous fuels operations to procure the necessary resources to carry out large-scale burns on an opportunistic basis. The Grand Canyon fire management staff have already recognized this approach, and are now utilizing aerial ignition to burn large areas whenever favorable weather, fuel moisture and smoke dispersal windows occur.

Planned ignitions, possibly coupled with mechanical thinning, can be used to treat key areas to create buffers and protect boundaries. Once key areas are secured, lightning fires can be used on a more extensive basis to achieve management objectives. Now that new NPS fire policy has eliminated the rigid division between a suppression fire and a prescribed natural fire, management has the option to use multiple management strategies on individual fires to protect resources at risk while using a fire to achieve resource objectives in other areas.

The belief that forests across the North Rim have uniformly drifted far away from their natural state and are characterized by heavy concentration of hazardous fuels was not supported by our observations. Many areas of ponderosa pine forest still retain their natural open character, and could be prescribed burned with little difficulty. Other stands are probably are not as open as they were in the 19th century, but also have not produced excessive concentrations of fuels that would prohibit prescribed burning without preliminary mechanical treatments. The 1994 Report on the North Rim Hazard Fuels Situation recognized this fact, and recommended that these areas serve as the initial focus of a restoration program, to be followed by the treatment of more difficult areas. This is still good advice. Maintaining these areas while gradually expanding buffers around the areas of greatest hazard will reduce the threat of an escaped prescribed fire. Prescribed fire treatments should accelerate once the worst problem areas are isolated.

Mechanical removal of some trees and downed fuels may be another useful "tool in the toolbox" for managers. It could be used to create buffers along roads, along other key boundaries, and around developments so that prescribed fire can be used more safely. Dr. Covington's ecosystem restoration experiment will provide a basis for evaluating the short and long-term effects and benefits of mechanical fuel removal. The park is to be commended for broadening the scope of the research to include a comparison with direct introduction of prescribed fire and an intermediate treatment involving removing enough biomass to restore the forest to within the range of natural variability, without complete restoration to the 1870 presettlement target. Selective thinning to restore the forest to the upper end of fuels variability will allow safer prescribed burning in some areas and more rapid restoration of the natural fire process. However, selective thinning of under story trees combined with moderate intensity prescribed fire may remove fuel ladders, but also fire-proof the sub-canopy trees that have grown above 50 feet tall during the past 120 years. The unnatural density of these trees will continue to provide an avenue for wind-driven crown fires for some time if they are not thinned by fire or mechanically. A possible solution to this problem would be to mechanically remove some of these trees rather than the smaller under story ones, and then use prescribed fire to thin the smaller trees. This would allow the use of safer, more moderate intensity prescribed fires while still achieving the desired open forest structure in the long run.

An inspection of the Matthes and Northwest III prescribed burns, which were suppressed for escaping or threatening to escape prescription, revealed long-term ecosystem and fuels reduction effects that compare favorably with the Mt. Trumbull experiments. Areas on the Northwest III fire that were considered "too hot" for prescription actually produced excellent thinning of under story trees while scorching fewer of the presettlement ponderosa pine than did a slash burn on Mt. Trumbull. Areas that "torched" on the Matthes and Northwest III fires also produced an excellent regeneration of native shrubs and herbs without the need for reseeding or planting. So far, this has not been true on Mt. Trumbull. Numerous studies over 30 years in the ponderosa

pine mixed conifer forest has confirmed that localized “hot spots” were a natural occurrence and helped maintain the uneven aged mosaics of even aged trees in the forest. Any prescribed burning program on the North Rim should allow for such hot spots and their beneficial ecological effects.

As compared with Mt. Trumbull, the only problem with fire effects on the Matthes and Northwest III fires was the large number of standing dead trees, which will fall in future years to increase fuel loading once again. This problem can be solved by multi-stage burning over 10-20 years, in which subsequent burns remove incremental amounts of the dead trees as they fall to the ground. The problem throughout most western parks in this regard has been the lack of determination and resources to complete the second and third generation prescribed burns on a reasonable schedule. In summary, we believe that the park’s existing program to restore a more natural ecosystem and reduce hazard fuels through prescribed burning and the opportunistic use of unplanned ignitions should not be stopped or reduced in favor of an emphasis on the NAU approach of mechanically removing trees and burning slash. In fact, the prescribed burning program should be accelerated wherever possible utilizing the additional funding provided in the 1998 appropriation. Congress and the Administration have both recognized the time-urgency of addressing the hazard fuels problem, and the North Rim provides an excellent opportunity for the NPS to provide leadership in this area. The NAU research will provide additional information on the fire history of the North Rim and the viability of mechanical fuels removal. In time, NAU treatment methods may be used to augment the prescribed burning program, and accelerate restoration of natural fire regimes on the North Rim.